

CLAIMS

1. Porous structure comprising a porous carbon-fibre matrix (3, 15, 27, 37), said porous matrix being
5 bounded on least one of its faces (5, 17, 21, 30, 40,
42) by an impermeable layer (7, 19, 23, 29, 39, 41)
made of a carbon element chosen from carbon fibres,
carbon nanotubes, glassy carbon or combinations of
these, said impermeable layer being linked to the
10 porous matrix via carbon-carbon bonds.

2. Porous structure according to Claim 1, in which
said porous matrix (3) is bounded on a first face (5)
by an impermeable layer (7), as defined in Claim 1, and
15 on a second face (9) opposite the first face (5) by a
porous layer (11) made of a carbon element chosen from
carbon fibres and carbon nanotubes, said porous layer
being linked via carbon-carbon bonds to the porous
matrix.

20 3. Porous structure according to Claim 1, in which
said porous matrix (15) is bounded on a first face (17)
by an impermeable layer (19) and on a second face (21)
opposite the first face (17) by another impermeable
25 layer (23), said impermeable layers being as defined in
Claim 1.

4. Porous structure according to any one of Claims 1
to 3, which further includes a porous layer (31, 33,
30 43, 45), made of a carbon element chosen from carbon
fibres and carbon nanotubes, on said impermeable layer
or layers (29, 39, 41) and/or on one face (32) of the
porous matrix (27).

35 5. Porous structure according to Claim 2,

characterized in that it further includes an active layer (12) on said porous layer or layers (11).

6. Biplar plate or electrode/bipolar plate assembly
5 comprising a porous structure as defined in any one of
Claims 1 to 5.

7. Process for manufacturing a porous structure as
defined in any one of Claims 1 to 6, characterized in
10 that said process includes a step of producing said
impermeable layer(s):

15 1) by the growth of carbon elements,
chosen from carbon fibres and carbon nanotubes, on one
face or on two opposed faces of a carbon-fibre matrix
followed by densification of said carbon elements;
and/or

2) by formation of glassy carbon on
one face or on two opposed faces of a carbon-fibre
matrix when the carbon element is glassy carbon.

20

8. Manufacturing process according to Claim 7, which
includes a step of producing said carbon-fibre matrix
by the needle-punching of carbon fibres.